

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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**835,250**

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## COMPLETE SPECIFICATION

### Improvements in a method of Washing and in Washing Machines

We, JAMES ARMSTRONG & Co. LIMITED, a Body Corporate duly organised under the Laws of Great Britain, of 29, St. James's Place, London, S.W.1, England, do hereby

5 declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to washing machines and to methods of operating such machines, more especially of the kind in which the clothes and like textile articles are contained in a perforated drum or cage mounted to

15 oscillate or rotate in a chamber or vessel, usually of cylindrical form, of the so-called open type, with an aperture through which the clothes may be inserted and removed, such aperture being normally closed by a

20 door, and in which machines the washing or rinsing liquor is distributed along the top of the cage so that it falls through the perforations on to the clothes therein. The invention may be applied to side loading machines

25 or those intended for end loading.

In the Specification of co-pending Application No. 12608/53 (Serial No. 828,304) an improved washing machine of the kind above referred to is described having provision for continuous rinsing and in which the chamber or vessel housing the perforate drum or cage is furnished in its lower part with a partition or weir over which the rinsing water can spill during the rinsing operation.

35 According to the present invention, there is associated with a washing machine of the kind specified or with a group of such machines, a large storage tank of say 1000—2000 gallons capacity, for weak soap and alkali solution, and control valve mechanism

40 is provided so that the weak solution may be fed to and through the machine or machines during the washing operation and

thereafter the clothes in the drum or cage can be subjected to continuous rinsing.

The invention thus also comprehends an improved method of washing consisting in continuously supplying a weak detergent solution to a washing machine or to one or more of a group of machines of the kind specified during the washing process which may last some 10 to 20 minutes according to the degree of soiling of the clothes in the drum, and then, advantageously, while the clothes are still in the drum, continuously passing in rinse water for the requisite period.

The most important advantage of this method is that the dilute solution is fed in slowly and is discharged with soiling matter continuously so that the degree of soil in suspension in the liquor in the washer is appreciably less than when the older method of washing is carried out and in which strong soap and soda solution is added to the water in the machine and the latter then run for a period before the soiled water is run to waste.

When applied to washing machines as described in the aforementioned application, an additional supply conduit and valve are furnished for connecting it to the large detergent solution storage tank and another on the waste outlet, which valves can be regulated to pass the washing liquor at 1—2 gallons per minute according to the size of the machine, and if a single or twin storage tank is to be used with a group of washing machines it will be connected thereto by a main header carrying the detergent solution, with a valve controlled branch to each machine.

Apart from the advantage that the soiling matter from the clothes is discharged continuously from the machine during the washing operation so that the amount of soil matter in suspension in the liquor in the washer is

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- appreciably less, the gradual build-up of pH after the previously moistened clothes are subjected to the continuous bathing in the dilute solution facilitates separation of the soiling matter from the textile materials owing to the reduced interfacial tension between such matter and the clothes, and thus enables considerable economies in soap and detergent to be effected.
- 10 A further advantage of the improved effective system of washing is the simplicity by which automatic control can be achieved and it will be appreciated that a single time relay control valve on the conduit supplying detergent liquor to the washing machine may be sufficient, the waste valve being supplemented by an external weir providing a passage or orifice to waste or discharge but retaining the requisite quantity of liquor in the machine during the continuous washing operation. Moreover, such weir and the outlet or aperture to waste or discharge may be adjustable to cope with the considerably higher rate of flow of the liquid when continuous rinsing is in progress.
- 15 Similarly, time relays may control the steam inlet provided to raise the liquor in the washing machine to the requisite temperature.
- 20 The invention will be further described with reference to the accompanying drawings wherein Figure 1 is a schematic sectional view of a form of drum washing machine suitable for the process while Figures 2 and 3 are perspective views of an actual installation having a battery of seven such washers;
- 25 Figure 4 is a circuit diagram showing how control of the washing process may be automatically effected.
- 30 Referring now to the drawings but first more particularly to Figure 1, the washer illustrated has a cylindrical outer casing 1 mounted on a pedestal 2 and a rotating or oscillating cylindrical perforate cage 3 for containing the clothes to be washed represented at 4.
- 35 The washer illustrated is of the kind described in the aforementioned Specification No. 828,304 (Application No. 12608/53) modified in the following respects:—
- 40 (a) By the addition of a continually open waste-pipe 5 to the weir 6 which already existed in the design.
- 45 (b) The introduction of a quick-action lever 7 and control valve 8 for the admission of hot detergent solution.
- 50 From Figures 2 and 3 it will be seen that the plant consists of four 50 lb. and three 25 lb. washers erected side-by-side roughly two feet from a wall 10 and over a floor drain 11. Overhead attached to the wall are four parallel pipes 12 to 15 the bottom being branches of a "U" ring main (out and return respectively) for the supply of hot solution; the top pipe supplies cold water and that next to it

the steam. At one end are two rectangular tanks 17 and 18 used alternately for mixing the solution the tank 17 being filled while the tank 18 is in use and vice versa. The solution is lifted by a motorised pump (not shown) to the ring main 12 and 13 from which any excess returns to the tank 17 or 18 under low pressure. Each washing machine is connected at the top by three separate junction pipes 19, 20, 21 to the ring mains respectively for the solution, cold water and steam, the first being tapped into the washer by the quick-acting lever valve 8 which serves by its arm 7 as a visible signal the arm being horizontal when "on" and vertical when "off".

70 From Figure 1 it can be seen that a distinguishing feature of the machine is that the weir maintains a constant predetermined dip and ensures that any additions of liquor beyond this dip will cause an equal amount to flow away.

75 In the practice of the invention according to one example a solution in each of the supply tanks is made up as follows:—

80 21 lbs. of 45 tire soap.  
50 lbs. of sodium metasilicate.  
1200 galls. of water.

85 This represents a tankful and lasts roughly 6 hours using all seven machines in the battery, being maintained at 140° F. by flash steam, introduced into the tanks under control of a thermostat.

90 After loading the washer, which already contains a dip of cold water for pre-wetting the clothes, and starting the cage, the solution lever 7 on the machine is lifted for 15 minutes during which the control valve permits a supply of detergent solution to enter from the mains at the rate of 1 gallon per minute. For the whole of this time the solution is running through the soiled washing and continuously flowing to waste carrying away the dirt removed. Steam is turned on when required to raise the temperature of the liquor in the washer to 180° F., until shut off before the second part of the process. The latter is a cold rinse at 25 gallons per minute, secured by lifting the cold water inlet valve lever after turning off the hot solution control.

95 This gives a combined loading, washing and rinsing cycle of 20 minutes and is applied to everything except woollens. Small quantities of hypochlorite bleach are only used on white coats and table linen conveniently for stain removal, not to ensure whiteness, a point emphasised by the continuous flow action resulting in the immediate dilution and washing to waste of these additions. By varying the time different types of soiling may be treated by the operator who, however has no control of the detergent, avoiding destructive and expensive over-strength solutions.

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In plant where a supply of hot water is available the layout will be modified accordingly.

A suitable automatic control for the simplified washing process is shown diagrammatically in Figure 4, where 31 is a timing unit, 32 is a time lag push button, 33 are warning lights, and 34 are solenoid air valves, controlling the supply of compressed air to 35, 36 which are inlet and outlet valves respectively for the solution and 37 which is an inlet valve for steam. 38 is an air relay valve, 39 is the continuous rinse outlet and 40 is a cold water inlet, 41 is the timer motor. Compressed air is supplied by the pipeline 42.

Operation is as follows. The work is first saturated by running the machine with cold water for one minute. This operation is performed manually and while it is in progress the green warning light will glow.

At the completion of this operation, the operator presses the time lag push button 32, this sets the timer motor 41 in motion and the timed sequence commences. The colour of the warning light 33 is altered to red by the automatic throwing of switches A and E, and at the same time switch B energises solenoid valve F and both soap solution inlet valves 35, 36 are opened, and remain so for fourteen minutes. During this period the steam valve 37 is automatically operated (if fitted) by means of switch C and solenoid valve G. When the washing operation is completed switches A and B are operated automatically in such manner that both soap solution valves close and both the warning lights glow.

The operator now attends to the outlet of the machine and having completed his task, presses the push button a second time.

This restarts the timer motor and the throwing of switch D opens the cold water inlet 40 and continuous rinse outlet 39 and continuous rinsing is performed for the customary six minute period. Whilst this operation is in progress the red warning light glows.

When this operation is completed the timer motor 31 stops and the warning light 33 reverts to green.

Finally, where a group of washing machines is installed, instead of a main supply pipe carrying the detergent solution having valve controlled branches to each machine, it may pass the solution into one machine of the group which are so interconnected that the liquor then passes in series through all the machines of the group. Similar arrangements may be made for passing the rinse water in series through the machines of a group during the continuous rinsing operation.

#### WHAT WE CLAIM IS:-

1. A process for washing clothes and like

textile articles comprising continuously supplying a premixed weak detergent liquor from a main storage tank by downward delivery to a washing machine or to one or more of a group of washing machines of the kind specified independently of the supply to the remainder, maintaining a substantially constant volume of detergent in the machine or machines during the washing operation, supplying steam to the detergent solution during the washing operation, independently interrupting the supply of detergent solution and steam to the machine or to any washing machine of the group and independently supplying cold rinsing water to the machine or to any machine of the group, and continuously draining off the soiled liquor from that machine.

2. A process for washing clothes according to the preceding claim wherein the premixed weak detergent liquor comprises a solution having approximately the following proportions: 21 pounds of 45 titre soap, 50 pounds of sodium metasilicate and 1200 gallons of water.

3. A process for washing clothes according to Claim 1 wherein small quantities of a bleaching agent are added during the washing operation.

4. Apparatus for washing clothes and like textile articles according to the process claimed in Claim 1, wherein there is associated with a washing machine, or with a group of machines, in which the cycle of operations for each machine is independent of the remainder of the machines of the group, at least one large storage tank for premixed weak detergent liquor, each machine being provided with control valve mechanism and an open waste pipe so that the washing liquor may be continuously fed from the storage tank to and through the machine by downward delivery during the washing operation and including means for supplying steam to the liquor during such operations, and wherein a weir is located in the waste pipe of the machine such that a substantially constant volume of liquor is maintained in the machine during the washing operation.

5. Apparatus according to Claim 4 including a valve controlled cold water supply above the machine or machines such that after the washing operation the clothes can be subjected to continuous rinsing by water flowing through the machine.

6. Apparatus for washing clothes and the like constructed and arranged to operate substantially as described with reference to the accompanying drawings.

7. A method of washing clothes and the like substantially as described.

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PROVISIONAL SPECIFICATION  
No. 7633, A.D. 1956.

**Improvements in a method of Washing and in Washing Machines**

We, JAMES ARMSTRONG & Co., LIMITED, a Body Corporate, duly organised under the Laws of Great Britain, of 29, St. James's Place, London, S.W.1, England, do hereby declare this invention to be described in the following statement:—

This invention relates to washing machines and to methods of operating such machines, of the kind in which the clothes are contained in a perforated drum or cage mounted to oscillate or rotate in a chamber or vessel usually of cylindrical form of the so called open type with an aperture through which the clothes may be inserted and removed, such aperture being normally closed by a door. The invention may be applied to side loading machines or those intended for end loading.

In the specification of co-pending Application No. 12608/53 (Serial No. 828,304) an improved washing machine is described having provision for continuous rinsing and in which the chamber or vessel housing the perforate drum or cage is furnished in its lowest part with a partition or weir over which the rinsing water can spill during the rinsing operation.

According to the present invention, there is associated with a washing machine or with a group of such machines, a large storage tank of say 1000—2000 gallons capacity, for weak soap and alkali solution and control valve mechanism is provided so that the weak solution may be fed to and through the machine or machines during the washing operation and thereafter the clothes in the drum or cage can be subjected to continuous rinsing.

The invention thus also comprehends an improved method of washing consisting in continuously supplying a weak detergent solution to a washing machine during the washing process which may last some 15 to

20 minutes according to the degree of soiling of the clothes in the drum, and then while the clothes are still in the drum continuously passing in rinse water for the requisite period.

The most important advantage of this method is that the dilute solution is fed in slowly and is discharged with soiling matter continuously so that the degree of soiling in suspension in the washer is appreciably less than when the older method of washing is carried out and in which strong soap and soda solution is added to the water in the machine and the latter then run for a period before the soiled water is run to waste.

When applied to washing machines as described in the aforementioned application an additional supply conduit and valve are furnished for connecting it to the large detergent solution storage tank and another on the waste outlet, which valves can be regulated to pass the washing liquor at 1—2 gallons per minute according to the size of the machine, and if a single storage tank is to be used with a group of washing machines it will be connected thereto by a main carrying the detergent solution with a valve controlled branch to each machine.

It will be appreciated that the detergent solution is considerably weaker than that normally employed and that a principal advantage of this effective system of washing is the simplicity by which automatic control can be achieved since an electric time relay set for the duration of the washing process to open and close the appropriate valves at the pre-selected time and another time relay for the continuous rinse are all that is required.

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PROVISIONAL SPECIFICATION  
No. 14387, A.D. 1956.

**Improvements in a method of Washing and in Washing Machines**

We, JAMES ARMSTRONG & Co., LIMITED, a Body Corporate, duly organised under the Laws of Great Britain, of 29, St. James's Place, London, S.W.1, England, do hereby declare this invention to be described in the following statement:—

This invention relates to washing machines and to methods of operating such machines.

In the specification of co-pending Application No. 7633/56 an improved method of washing is described consisting in continually supplying a weak detergent solution to

a washing machine during the washing process which may last some 15 to 20 minutes according to the degree of soiling of the clothes in the drum, and thereafter rinsing the clothes. Advantageously, particularly where the washing machines employed are as described in the specification of co-pending Application No. 12608/53 (Serial No. 828,304) the clothes may be subjected to continuous rinsing whilst still in the drum of the washing machine.

Apart from the advantage that the soiling

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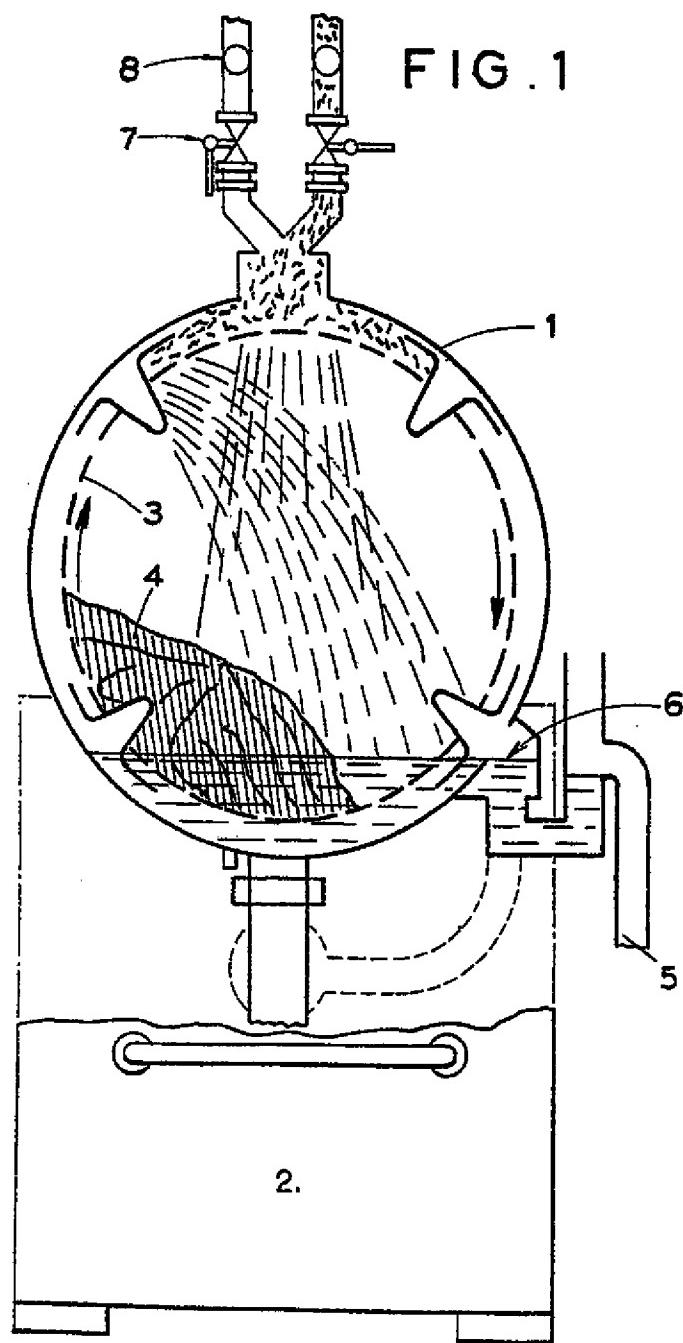
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- matter from the clothes is discharged continuously from the machine during the washing operation so that the amount of soiling matter in suspension in the liquor in the washer is appreciably less, the gradual build-up of pH after the previously moistened clothes are subjected to the continuous bathing in the dilute solution facilitates separation of the soiling matter from the textile materials owing to the reduced interfacial tension between such matter and the alkaline detergent, and thus enables considerable economies in soap and detergent to be effected.
- A further advantage of the improved effective system of washing is the simplicity by which automatic control can be achieved as mentioned in co-pending Application No. 7633/56 and it will be appreciated that a single time relay control valve on the conduit supplying detergent liquor to the washing machine may be sufficient, the waste valve being replaced by an external weir or launder providing a passage or orifice to waste or discharge but retaining the requisite quantity of liquor in the machine during the continuous washing operation. Moreover such weir, launder and the outlet or aperture to waste or discharge may be adjustable to cope
- with the considerably higher rate of flow of the liquid when continuous rinsing is in progress.
- Similarly, time relays may control the steam inlet provided to raise the liquor in the washing machine to the requisite temperature, although where this is thermostatically controlled the same relay which regulates the inlet valve may also be connected to the steam valve the latter being closed automatically by the thermostat when the requisite temperature has been reached.
- Finally, where a group of washing machines is installed, instead of a main supply pipe carrying the detergent solution having valve controlled branches to each machine, it may pass the solution into one machine of the group which are so interconnected that the liquor then passes in series through all the machines of the group. Similar arrangements may be made for passing the rinse water in series through the machines of a group during the continuous rinsing operation.

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FIG. 1



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SHEETS 1 & 3

FIG.3.

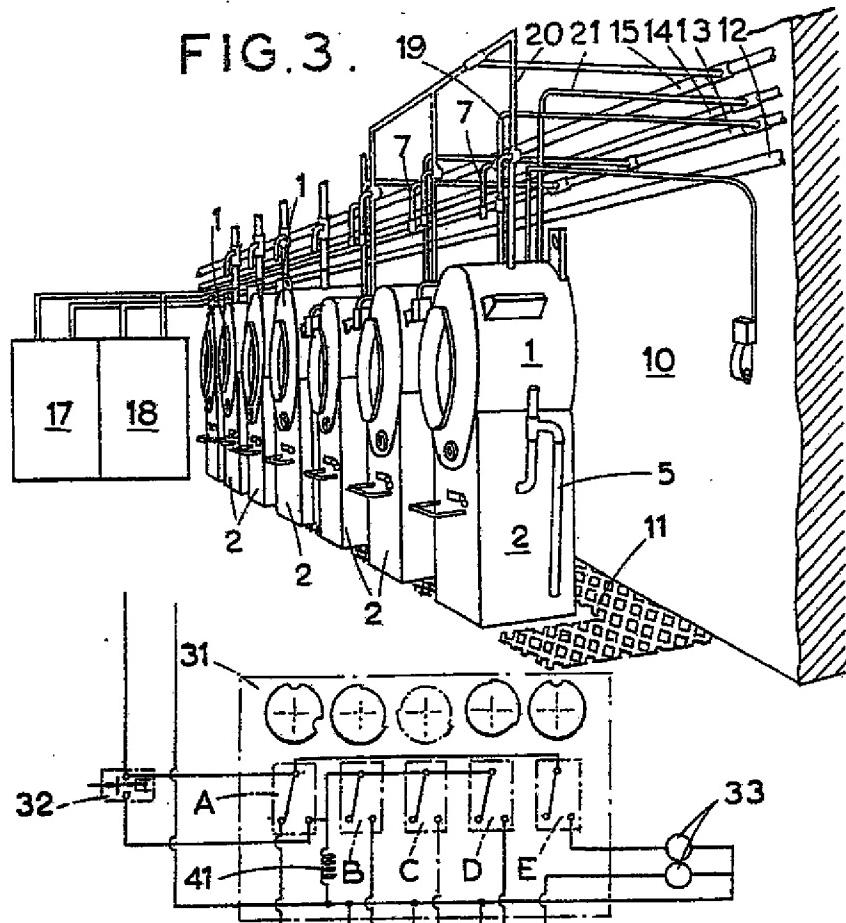
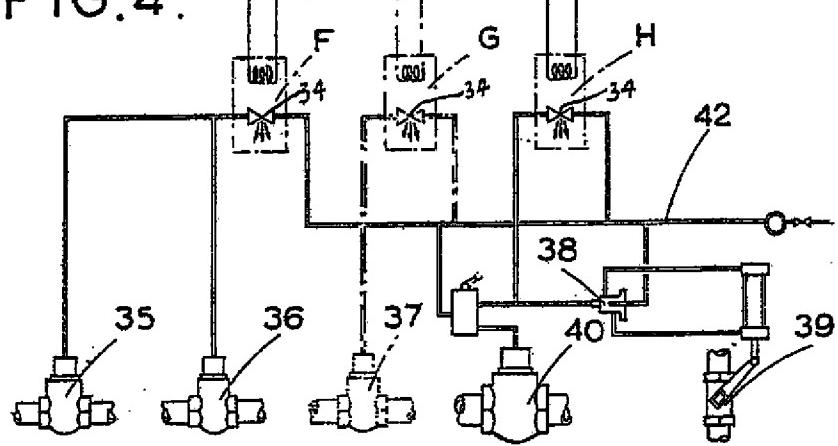


FIG.4.



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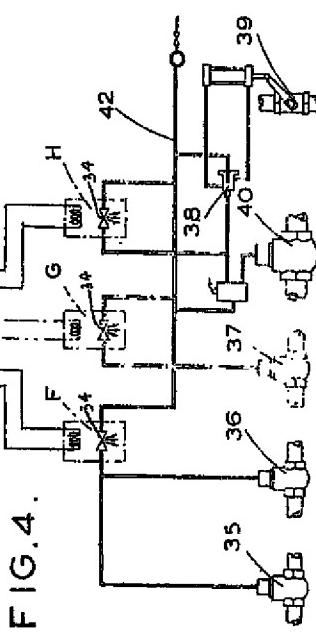
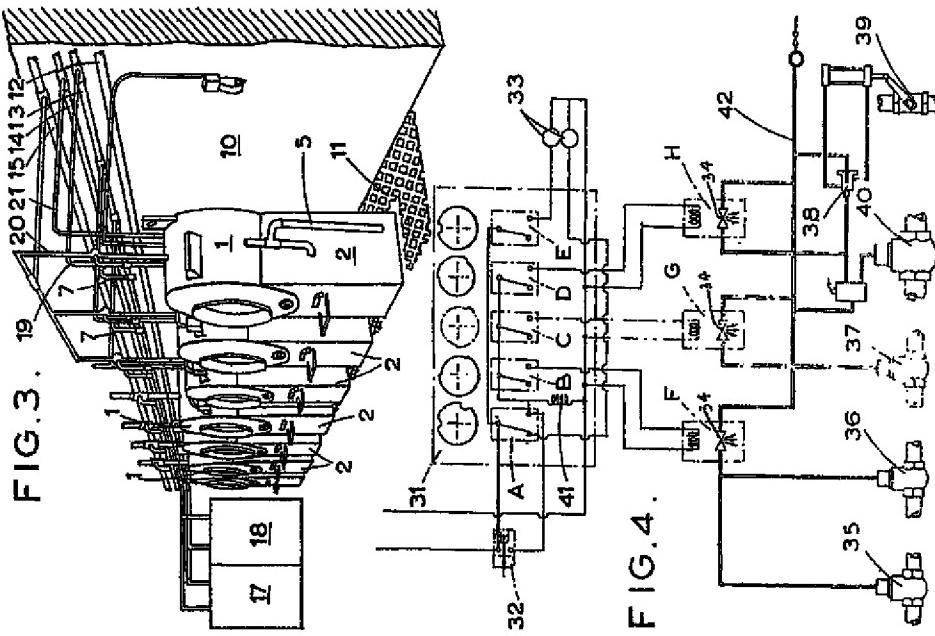
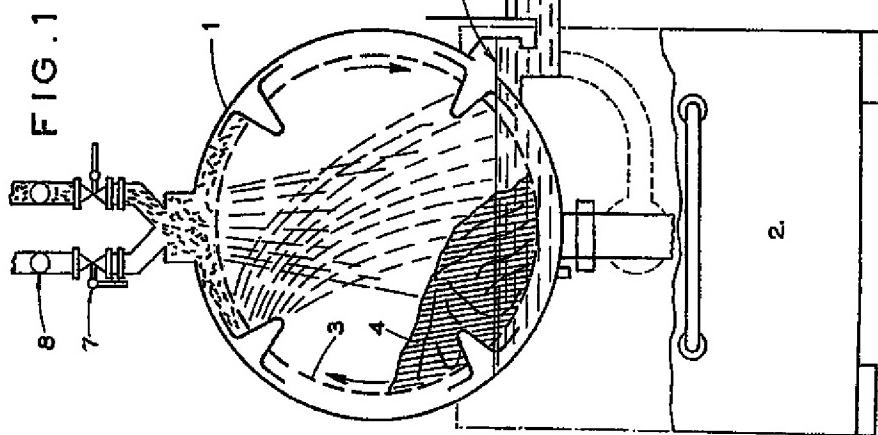
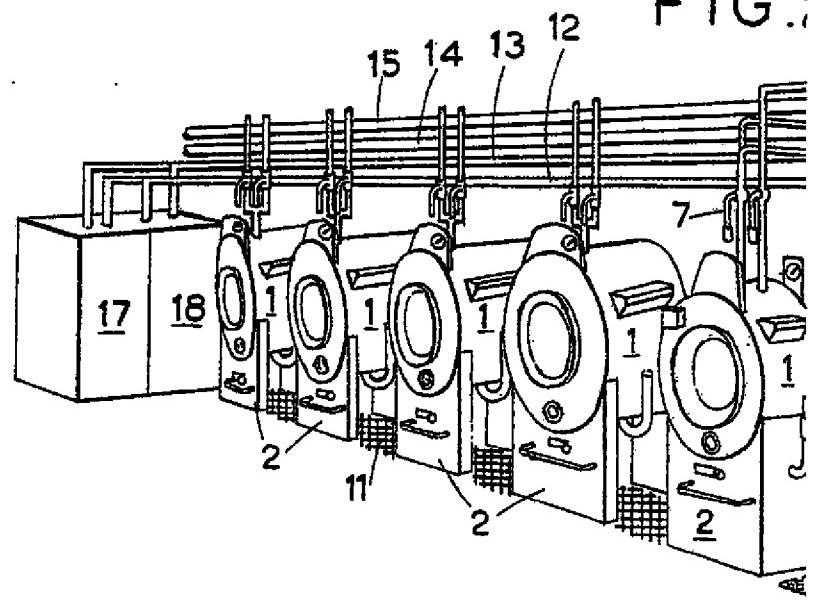


FIG.



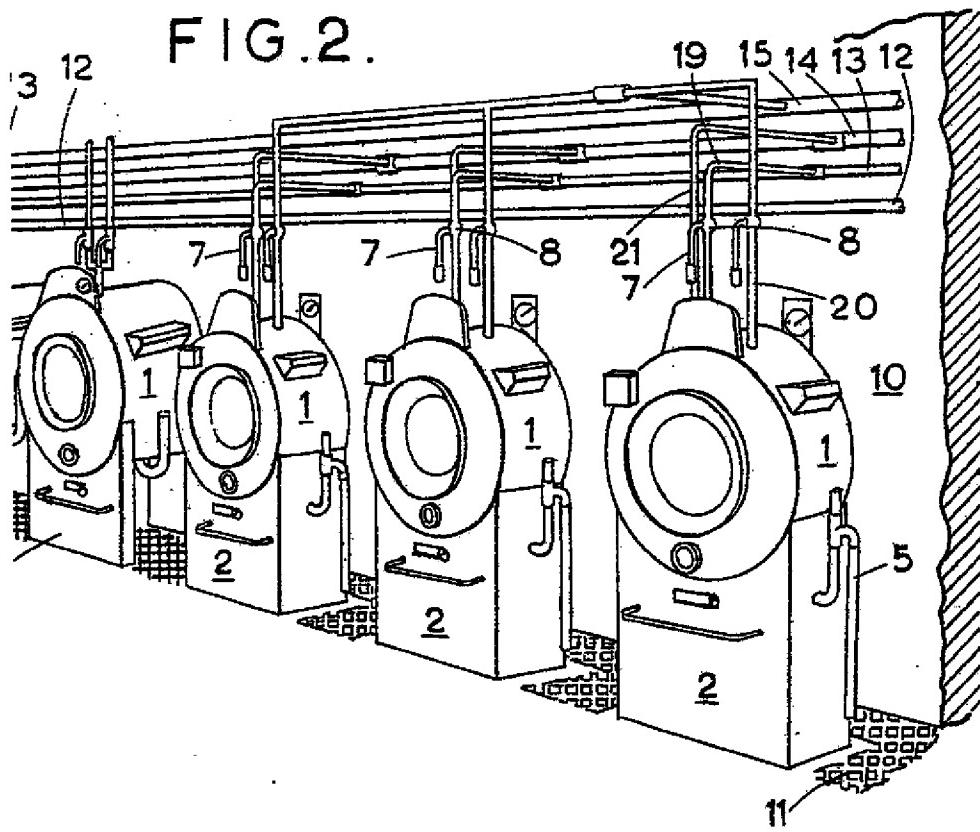
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the Original on a reduced scale.*

SHEET 2

FIG. 2.



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SHEET 2

FIG. 2.

